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Clinical characterization of a type 2 PRRSV causing significant clinical disease in the field in Denmark

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Introduction

PRRSV is the cause of significant reproductive and respiratory disease in swine worldwide. In Denmark, approximately 50 % of the herds are seropositive for PRRSV of either or both Type 1 or Type 2. In November 2010, a pig herd in the Northern part of Denmark experienced an outbreak with Type 2 PRRSV where the clinical impact appeared to be much more severe than usually reported from Danish Type 2 PRRSV affected herds. Due to the clinical observations of reproductive failure (stillborn & mummified) in sows and high mortality in piglets, it was speculated that a new, more pathogenic PRRSV strain had evolved in Denmark. The aim of this study was: 1) to make a clinical characterization of the virus isolated from the herd by comparing the infection dynamics of the virus isolated from the herd with an older Danish Type 2 isolate (DK-2010-10-13-1) by experimental infection in young pigs and 2) to assess the protective effect of a MLV Type 2 vaccine against this recent Danish Type 2 PRRSV isolate.

Materials and Methods

Samples from the PRRS clinical case collected in Nov 2010 were obtained and the virus, designated DK-2010-10-13-1, was isolated in Marc-145 cells using general cell culture procedures and sequenced in full. Twenty-eight 4-week-old pigs from a commercial farm with health status according to the Danish Specific Pathogen Free (SPF) system were randomly divided into one control group N=4 (group 1) and three experimental groups (groups 2-4) (N=8). The groups were housed in separate sections at biosafety 3 facility. Pigs in group 4 were vaccinated (2 ml i.m.) with Ingelvac® PRRS MLV vaccine (Boehringer Ingelheim Animal Health). Four weeks later, at post inoculation day (DPI) 0, pigs in group 1 were sham- inoculated intranasally (i.n.) with Eagle's MEM. Pigs in group 2 and group 3 were inoculated i.n. with DK-1997-19407B and DK-2010-10-13-1 isolates respectively. Pigs in group 4 were challenged with the DK-2010-10-13-1. The study was carried out in accordance with the Danish and EU regulations on the use of laboratory animals for research. Individual daily clinical scoring and individual rectal temps were recorded. Blood samples were collected from all pigs on DPI -28, 0, 3, 7, 10, 14, 21, 28, and 30 for PRRS RT-PCR and serology. Samples were collected from lungs at necropsy for histopathology and virus quantification by RT-PCR.

Results

All pigs remained healthy throughout the experimental period. At necropsy, only minor lesions were revealed.

PRRSV was detected by real-time RT-PCR in all pigs inoculated (figure 1). The viremia peaked at DPI 7, and was significantly lower and of much shorter duration in the vaccinated group (group 4) compared to the unvaccinated animals ($p=0.04$). Histopathology results are pending and will be presented.

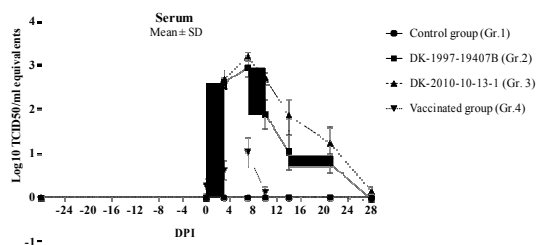


Figure 1. Viral load in serum quantified by real-time RT-PCR

Conclusions and Discussion

PRRSV isolated from a herd experiencing overt clinical signs and significant mortalities, failed to induce comparable signs in this experimental set-up but if the reproductive infection model have been used the signs may have been more like the signs seen in the herd. Full genome sequencing of the isolate revealed that the isolate was very similar to other Danish Type 2 isolates. Our data suggested that the severity of the disease in the field could be influenced by other factors than the virus and emphasize the need to aim further research for identifying virulence markers of PRRSV. In addition, the results demonstrated that vaccination with Ingelvac® PRRS MLV vaccine (Boehringer Ingelheim Animal Health) reduced viremia and viral excretion, thus being effective of limiting the impact of the DK-2010-10-13-1 case virus and as such would be expected to be effective in the control of an outbreak with this and related viruses. These findings are in accordance with the finding that the vaccine was used effectively in the control of the infected herd.

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